INTER-VERTEBRAL IMPLANT WITH ANGLED PLATE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 12/650,600 entitled "Cervical Spacer", filed on Dec. 31, 2009 and currently pending. The entire disclosure of U.S. patent application Ser. No. 12/650,600 which was published as U.S. Patent Publication No. 2011-0160860 AI on Jun. 30, 2011 is hereby incorporated by reference in its entirety.

BACKGROUND

The present invention relates to spinal column spacers.

The human spinal column consists of 33 (sometimes 34) vertebrae divided into five groups: cervical, thoracic, lumbar, sacral and coccygeal vertebrae areas. The sacral vertebrae are fused into a single bone as is the coccygeal vertebrae, usually designated as the coccyx. The movable vertebrae are found in the cervical, thoracic and lumbar areas. Each area has a characteristic curve. Thus, various vertebrae differ in size and shape depending on their location in the spinal column.

Spacers exist for repairing the spinal column. Most of the known spacers are designed for the lumbar or thoracic regions of the spine. Since the lumbar or thoracic vertebrae are structurally different from the cervical vertebrae, spacers designed for the lumbar or thoracic region will not perform properly in the cervical region. Most devices used clinically for repairing the anterior cervical area of the spine usually involve some elements of screw, plate, and spacers for bony attachment and/or support.

Various prior art cervical spacers are known. These devices may be made from X-ray transparent materials or from X-ray opaque materials. Devices made from X-ray transparent materials typically are, as the name implies, difficult to see on routine radiographic X-ray studies. Although they may be visualized on expensive CT scans with a much high patient radiation dose, these spacers still cannot be seen directly on plain radiographic images that are routinely used for follow up examination and monitoring of the bony healing and alignment. It has been proposed to solve this imaging problem by adding dots or spots of X-ray opaque markers to the spacers. However the position of the spacer must be inferred on the basis of these markers, generally leaving some ambiguity of the exact position of all of the edges. Devices made from X-ray opaque materials, on the other hand, can be seen on X-ray, but the opaqueness often makes it difficult to assess the status of healing grafting material inside the spacer, and in some cases difficult to assess the position of the attaching screws of the construct. One method directed to solving this problem is a skeletal frame that is opaque to X-rays, but, because of being a skeletal structure, has openings that allow X-ray passage and therefore permit the doctor to view the interior of the spacer. Specifically, these spacers employ a skeletal frame of a material such as titanium, the skeletal form providing multiple openings allowing X-ray visualization of the interior of the spacer. Regarding the known designs for cervical spacers, these represent the state of the art that strives to meet two important performance criteria: strength, increased by the titanium frame, and X-ray transparency, provided by the multiple openings of the skeletal frame.

The present inventors have identified, however, that this state-of-the-art cervical spacer, constructed with a skeletal form, regardless of the specific shape of the skeletal form, must arrange and dimension the skeletal member to proved windows or openings large enough to enable viewing of the interior of the skeletal form by X-ray. These windows allow the doctor to monitor the process of as the surgical arthrodesis heals to a mature fusion between the upper and lower vertebrae. However, it is inherent to a skeletal structure cervical spacer that these windows or openings cannot be enlarged formed without sacrificing strength of the device. Simply put, to make the openings larger there are two options: make the skeletal members with a smaller diameter, or use fewer skeletal members. Both of these decrease strength

Various embodiments of the disclosed invention solve these long-felt needs for practical stabilization of the cervical vertebrae and offer additional features and benefits, such as, for example, significantly increased strength to the spacer while maintaining sufficient X-ray transparency or translucency to enable proper follow-up monitoring with conventional X-ray methods.

SUMMARY

In light of the long-felt need for strong cervical spacers which do not impede X-ray observation of the site of implantation, a brief summary of various examples of one embodiment is presented. Some simplifications and omissions may be made in the following summary as it is intended to highlight and introduce some aspects of the various examples of one embodiment, not to limit the scope of the disclosure. Detailed descriptions of an illustrative exemplary embodiments that will further assist those of ordinary skill in the art to make and use the disclosed subject matter will follow in later sections.

The applications of the disclosed embodiments generally relate to other applications may be understood by persons of ordinary skills in the art, though, upon reading this disclosure an anterior cervical spinal column support. One example comprises a unique hollow prism-shaped frame arranged and diminished to fit between and stabilize cervical vertebrae. This and other examples provide spacing and support where, for example, the intervertebral disc has failed due to a slipped, herniated or ruptured disc. Because of the nature of degenerative disease in the cervical area, typically the example embodiments are used after a one or two level anterior cervical discectomy in degenerative disc disease where fusion and internal stabilization is desired. In more severe cases of cervical degenerative disease three or four levels may be stabilized. One among the features and benefits of various example embodiments is the provision of mechanical stabilization against bending. Another among the features and benefits of the various example embodiments is the correction of loss of normal lordosis angle and disc space height loss that commonly accompanies the degenerative disc disease. Another feature and benefit of the various example embodiments is the provision of a hollow space within the support configured to hold a bone graft, or any other type of bone grafting material. One further feature and benefit of the various example embodiments is the elimination of escape of grafting materials from the interior of the spacer.

Various examples according to one embodiment provide an implantable spacer that performs as an anterior cervical column support device.

Examples according to one embodiment provide an anterior cervical column support device for insertion between a first spinal vertebra and a second spinal vertebra, comprising a hollow frame, preferably a hollow prism-shaped frame, more preferably a hollow right prism-shaped frame, having a top load bearing surface and a bottom load bearing surface.